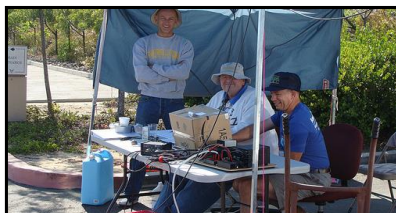




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Name: _____ Date: _____

The Resurgence of Amateur Radio



1. Radio waves are part of the electromagnetic spectrum. Radio waves have wavelengths ranging from 100 km to 1 mm. The corresponding frequencies range from 3 Hz to 300 GHz. Propagation of radio waves depends on their frequency. Generally, frequencies above 30 MHz propagate line-of-sight, meaning that antennas have to be within sight of each other. Radio waves penetrate walls, so indoor antennas work just fine. Radio waves with frequencies below 30 MHz rely on Earth's ionosphere for propagation. The ionosphere is a part of the upper atmosphere that is ionized by solar radiation. It can refract and guide radio waves. Depending on the time of day and the Sun's behavior (e.g., solar flares), radio waves may travel for longer or shorter distances around the globe.
2. All radio communications require certain common equipment. A receiver consists of an antenna, filters, and amplifiers. It converts signals from the antenna to a usable form. A transmitter produces radio waves with the help of an antenna. Other equipment used today often includes a computer for keeping track of messages and digital communication modes. Radio equipment is available from different retailers. However, many teens and adults can build their own basic components. For example, a receiver can be built from a sturdy plastic bottle, some insulated wire, a germanium diode, alligator clips, and a telephone handset. The transmitter would have to be built separately.
3. Radio communication does not require relay towers. Relay towers can be toppled by earthquakes or hurricanes. They can also be overloaded with messages during a disaster. So, when towers are unavailable, radio communication can be a lifesaver. Amateur radio operators become a critical part of communications. They are trained to participate in disaster response with emergency personnel.
4. Amateur radio operators are also known as "hams." There are about two million hams active around the world. As of 2013, the number of licensed operators in the U.S. exceeds 700,000. More ham operators are licensed every year. Ham operators are amateurs; they cannot receive monetary compensation for their activities. Most ham operators are very knowledgeable about radios. Enthusiasts come together in clubs and associations, sharing knowledge and skills. Certain frequencies across the radio spectrum are set aside for ham operators around the world.



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5. Most ham operators use radios for fun. They enjoy communicating with people around the world and across town. Some even communicate with ham operators in space! Line-of-sight communication can be used by astronauts and equipment flown on the International Space Station (ISS). Ham radio operators on Earth can talk to astronauts or use the ISS to relay a message to another ham radio operator on Earth. The relay works as long as both ham operators on Earth can see the ISS at the same time. Others hunt for signals from unmanned spacecraft. In November 2011, NASA launched "Curiosity" aboard the NASA Mars Science Laboratory. Within hours of its launch, ham operators in Germany pointed a large antenna at the sky. A computer aimed the antenna at the appropriate region of the sky. They picked up signals from the spacecraft on its way to Mars.
6. Occasionally ham operators are asked to solve down-to-earth mysteries. Remote locking devices for cars use radio waves. Outside one department store, shoppers discovered that their remote locking devices did not work. Ham operators were brought in. They walked around with hand-held antennas and a receiver. They discovered that strong stray radio signals emitted from the building interfered with the locking devices. Store personnel were alerted and repaired the offending equipment. By law, no one can transmit radio signals strong enough to interfere with other equipment nearby. Ham radio operators have fun in many ways!